THE GENERAL BOARD

United States Forces, European Theater

ENGINEER TACTICAL POLICIES

MISSION: Prepare report and recommendations on those engineer functions that most affected tactics as they were carried out in the European Theater of Operations.

The General Board was established by General Orders 126, Headquarters European Theater of Operations, US Army, dated 17 June 1945, as amended by General Orders 182, dated 7 August 1945 and General Orders 312 dated 20 November 1945, Headquarters United States Forces, European Theater, to prepare a factual analysis of the strategy, tactics, and administration employed by the United States forces in the European Theater.

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APO 408

ENGINEER TACTICAL POLICIES

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THE GENERAL BOARD
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ENGINEER TACTICAL POLICIES

CHAPTER 1

INTRODUCTION

1. General Scope of Study. This is a study of those engineer functions that most affect the tactics of a field army. It includes the five major phases of tactical operations of particular interest to engineers in the European Theater of Operations and the general procedure followed to coordinate normal engineer activities.

2. Arrangement by Chapters. Each of the succeeding chapters covers one subject; the first five chapters are devoted to those operations involving the combined arms, and the sixth chapter to the procedure followed at the various echelons within a field army to coordinate the normal engineer support.

3. Conclusions and Recommendations. Appropriate conclusions and recommendations are included at the end of each chapter.

4. Aviation Engineers. As this study has been limited to consideration of the engineer component of a field army, no attempt has been made to discuss the specialized subject of employment of engineers on construction of airfields, both for tactical and resupply purposes. In the European Theater, the Air Force was in complete charge of these activities, which were accomplished primarily through the agency of the IX Engineer Command. Details of these activities are found in the publications entitled "The History of IX Engineer Command" and "Development of Organization and Operating Procedure of the Ninth Air Force in the ETO".

CHAPTER 2

RIVER CROSSINGS

SECTION 1

INTRODUCTION

5. Scope. This study is based on all available data on river crossing operations, opposed or unopposed, in the European Theater of Operations. It is limited to the engineer aspects of this type of operation, but includes the coordination between engineers and other arms.

SECTION 2

DOCTRINE

6. Doctrinal Reference. The doctrine considered in this study is that outlined in FM 100-5 and FM 5-6.

7. Width of Bridgehead. The high mobility of enemy reserves of armor and artillery permitted their employment over great distances and greatly extended the width of front upon which the attacker had to assault a river line.

8. Depth of Bridgehead. Enemy armored vehicles greatly extended the depth of penetration necessary to reach phase line I, as outlined in the written doctrine. Where, in World War I, phase line I was rarely more than a few hundred yards beyond the far shore, it was, during World War II, frequently necessary to advance as much as 3000 yards in order to eliminate all direct fire weapons bearing on the bridge site. The attainment of phase lines I and II was made more difficult1,2,3 by the enemy practice of infiltrating our lines with snipers, artillery observers and mobile artillery pieces.3,4,5

9. Infantry Support Weapons. Also during World War II the infantry support weapons (tanks, tank destroyers, and anti-aircraft artillery) were so closely integrated into the infantry assault team that it was invariably the commander's desire that these elements join the infantry on the far shore at the earliest possible moment.3,4,6 To satisfy this desire the schedule of engineer operations was materially altered and rarely followed that outlined in connection with the prescribed phase lines. Ferries were rarely used except on streams of considerable width (400 feet and over),7,8 as it was generally more expeditious to build a bridge initially than to assemble it from component ferry sets. Construction of the bridge was rarely delayed until phase line II had been achieved. In most instances the construction of the bridge was accomplished during the attack from phase line I to phase line II, and in some instances, during the assault operation before phase line I had been reached.9,10,11,12

10. River Lines as Obstacles. Manuals emphasize the defensive characteristics of an unfordable river line and the necessity for detailed reconnaissance and preparation for the assault of such an obstacle. Very little consideration is given to the problem of river crossings during a sustained advance or a pursuit.

While the American doctrine touches lightly on the advantages

of river crossings in the pursuit, the Russian doctrine is emphatic in the advantages to be gained in placing phase lines and restraining lines beyond the bridgehead area so that the river crossing operation may, whenever possible, be made during the period of greatest disorganization of the enemy resistance.[13,14]

During the planning of operations river lines were consistently used as phase lines. Operational orders for the execution of these plans generally included instructions for the seizure of bridgeheads beyond these phase lines prior to halting.[69] It is not possible to determine what strategic and logistic considerations were responsible for these halts.

SECTION 3

OPERATIONS - GENERAL

11. River crossing operations were generally made on at least a corps front.[4,12,15] Generally all front line divisions of a corps attacked simultaneously. Instances in which a single division crossed to establish a bridgehead for the balance of a corps are rare.

12. Feints. The number of bridges required in each corps area was consistently high and left little room for the conduct of a full scale feint operation.[12,16] Primary and secondary crossing sites were chosen and tactical success at any site frequently changed bridge construction priorities after the assault had begun.[4] Frequently the number of bridges was limited by the availability of bridging equipment.[12]

13. Camouflage was used to conceal bridge dumps and to simulate dummy installations.[4,15,17,18] Noise transcriptions were broadcast, and small engines operated to attract the enemy's attention to possible bridge sites where no operations were intended.[6]

14. Tactical surprise was often achieved by accepting technical difficulties. Rivers were crossed at points requiring considerable approach work to avoid enemy artillery concentrations at key points within the existing road net.[19] Crossings were accomplished while rivers were near flood stage and during periods when large areas were inundated rather than to wait for more favorable conditions when an attack would have been expected.[7,19,20]

15. Smoke for screening river crossing operations was used extensively by some divisions and rarely or not at all by others.[3,21] Some commanders preferred to maintain observation for their own artillery, feeling that an immediate destruction of the hostile artillery by counter-battery was preferable to a temporary denial of observation to both sides.[3] The effectiveness of smoke was dependent upon the prevailing weather conditions and the degree of control established.[21,22,23,24]

16. The artillery support for river crossing operations was satisfactorily coordinated through corps and division fire control centers into which all artillery capable of support had been integrated.[15,25]

17. Artillery liaison planes operating over bridge sites provided one of the best forms of protection against hostile artillery fire; the enemy was reluctant to fire while observation capable of conducting counter-battery fire was overhead.[4,16]

18. Close air support from high performance aircraft was satisfactorily handled by air liaison groups at corps and division head-

quarters.[15,25,26]

19. Assault waves of infantry frequently either by-passed enemy groups or permitted such groups to infiltrate through the perimeter of the bridgehead making it necessary for engineers engaged in bridging operations to divert more troops to securing the bridgehead than is believed intended by the manuals. In most instances this requirement was met by the engineer commander with troops drawn from engineer sources. It was a continuing difficulty throughout all operations.[3, 15,21,25]

SECTION 4

ENGINEER OPERATIONS

20. Bridging Equipment in Division Engineer Units. In the reorganization and streamlining of the infantry and armored division river crossing equipment was removed from the divisional units and concentrated in bridging units attached or assigned to the armies and corps. Doctrine infers that these units were to have been attached to the division for each river crossing operation.

21. The strength of the divisional engineer battalion was reduced to such an extent that the organic engineer personnel was inadequate to meet normal requirements and represented only a fraction of the troops necessary in this type of operation. The attachment of engineer personnel to the division for these special operations is clearly contemplated by the doctrine, corps control thus being limited to the allocation of engineer personnel and bridging equipment.

22. Role of the Division Engineer. Although the responsibilities of the division engineer in the river crossing operation are clearly stated in the written doctrine, his role during such operations in the European Theater varied widely. In some corps the division engineers were considered as passengers not entering into the technical aspects of the river crossing operation at all and being transported by the corps engineers.[27] In others the division engineers were charged with crossing only of the assault waves.[28] More frequently the division engineers were integrated into the engineer plan either by the corps engineer or group commander supporting the division.[3,21]

23. Role of Corps Engineer. While it was true that most river crossings were conducted with divisions attacking simultaneously the river crossing operation in each division sector still remained a division problem and the responsibility of the division commander and the division engineer. However, since bridging units were attached to corps and crossings were normally made on a corps front, corps engineers were prone to consider the planning and execution of this operation a proper corps function.[12,16]

24. The control of the construction of bridges was retained by the corps engineer through the corps engineer group, battalion or bridge company commanders. This procedure placed the responsibilities of the division engineer in the hands of the corps engineer officers.[3,4,12,15,21] In some instances the group commander actually joined the division staff for the planning of the operation and became the division engineer in fact.[3,16] The amount of influence of the division engineer upon the operation was thus made dependent upon the personalities of the engineers involved.

25. Teamwork. Within any well-trained division exists a closely

knit team of the combined arms (infantry, artillery, tanks, and engineers). Each unit will develop strong points and exhibit weaknesses. By close association within the team, full advantage is taken of these strengths and poor results from weaknesses are minimized. In special operations where additional engineers are required the responsibility for planning must still rest upon the division engineer. His knowledge of the strength and weakness of the divisional units and the division method of operation places him in the position of being the engineer who can best determine the location and strength of the engineer support. Where the responsibility is passed to another agency, either corps engineer or group commander, the operation is reduced to the basic book principles and cannot be expected to include the refinements which can be provided only by the division engineer and which the division commander has every right to demand.

26. Training.

a. Deficiencies in training of combat engineers with the types of bridging employed in this theater were responsible for a continuing non-uniformity during bridge construction.

b. Engineer bridging units are organized and equipped to act primarily as transporting agencies, being used as construction agencies only in rear areas. The field manuals state that bridges are to be constructed by combat engineers assisted by the bridging unit.

c. Many of the engineer units arriving in this theater had not received training with any one of the three types of bridges employed (Heavy Ponton, Treadway and Bailey). Schools were operated by the theater to correct the deficiency in Bailey Bridge training and, prior to the invasion,[29] a few units had received training with the Treadway Bridge.[30] Each army conducted training in bridging whenever the tactical situation permitted.[15,18,31,32] It was an accepted fact that the bulk of combat engineer units on arrival in this theater were not sufficiently well-trained to construct bridges under fire.

27. Responsibility for Bridge Construction. The lack of familiarity of combat units with any of the three types of bridges employed made it imperative that the role of the bridging units be altered to provide more assistance and closer technical supervision than was contemplated.[12,16,33] Bridge unit commanders were frequently made responsible for construction of bridges irrespective of the size of the supporting combat units and with a disregard for the rank of the engineer commanders involved.[12,17,34] Where the technical difficulties were paramount this procedure worked well, but in instances where the tactical considerations were the governing factor only confusion resulted.[16]

SECTION 5

NAVAL AND HARBOR CRAFT EQUIPMENT

28. Naval and Harbor Craft equipment was employed by the First, Third and Ninth United States Armies in the Rhine crossings, and by the First and Ninth United States Armies in the Roer crossings. There was no difficulty experienced in the adjustment of the command echelon with the introduction of naval and harbor craft units as it has been agreed that the engineer officer in charge of the operation would define their employment.[15,17,35,36]

Of many types of craft employed the LCVP was easily the best

for engineer purposes. It was used as motive power for placing bridge raft sections, for placing anchor and guide lines, up-stream booms and anti-submarine nets. Following the construction phase it was invaluable in removing debris from the booms. During the period prior to the construction of sufficient bridges to handle regular traffic, LCVP's acted as ferries for assault personnel and for evacuation of wounded.15,17,35,36 LVT's (alligators) proved themselves valuable for crossing personnel and supplies and evacuating wounded where the bank conditions were difficult because of extensive marshes or flooding.21,36

The use of Naval and Harbor Craft vessels was limited by the conditions required for launching. Satisfactory launching required heavy lifting equipment located on hard standings immediately adjacent to deep water. These conditions were not easily satisfied and extended the launching time in all cases. Several vessels were launched by backing the transporting trailers and vessels into the water and floating the craft off. The trailers were either lost or seriously damaged by this operation.15,36

Although the presence of the Naval and Harbor Craft vessels proved advantageous in the crossing of the Roer and Rhine rivers, the engineers engaged in these operations felt that the limitations on the tactical use of this equipment were such as to suggest a review of the organic bridging equipment and power units to obviate the necessity for this type of craft.16

SECTION 6

BRIDGING UNITS

29. The bridging units in the European Theater were the Heavy Pontoon Battalion, Treadway Bridge Company, and the Light Ponton Company. The attachment of Tank Battalions, Tank Destroyer Battalions and Anti-Aircraft Artillery Battalions to divisions made it imperative that the initial bridges constructed be capable of passing tonnage far in excess of the capacity of the Light Ponton Bridge. As a result the Light Ponton Bridge was not employed and the Light Ponton Company became a transporting agency for the Bailey Bridge.30

30. New Bridge Units. It has already been indicated that all of the bridging units employed in the European Theater of Operations will be replaced in future troop bases by new organizations. The Engineer Panel Bridge Transport Company will replace the Light Ponton Company, the Engineer Ponton Bridge Company, Rigid Boat will replace the Heavy Ponton Battalion and the Engineer Ponton Bridge Company, Pneumatic Float will replace the Treadway Bridge Company.70

31. Bridging Equipment Within the Division. Dry bridging equipment of the treadway type was habitually turned over to the division engineers from corps units. This equipment was used to meet requirements for short bridges (30 feet or less) over culverts, shell holes, and slightly damaged bridges. In some corps it was the practice to keep about three truck loads (10S feet) with the division engineers of an infantry division and about twice that amount with the division engineers of an armored division.16

SECTION 7

CONCLUSIONS

32. The appearance of highly mobile armored vehicles and the generally increased range of artillery weapons during World War II in Europe required certain changes in the tactical application of the written doctrine. These changes did not, however, disclose any unsoundness in this doctrine.

33. The present doctrine should be expanded to place greater emphasis upon the role of the infantry during the establishment of bridgeheads for river crossings. It is almost as important that the bridgehead be cleaned of all enemy personnel and that the perimeter defenses be tight enough to prevent infiltration of enemy units as that the infantry attain any given phase line at the earliest possible time.

34. The doctrine should likewise be expanded to emphasize the advantages accruing to the attacker by crossing natural obstacles prior to temporary halts for regrouping and resupply. When natural barriers are used as general phase lines in an advance, instructions should emphasize the necessity for securing bridgeheads or the control of exits based on the plan of advance for the next phase.

35. The coordination between engineers and other arms during river crossing operations was satisfactory.

36. River crossing operations remain essentially a division problem and the detailed planning necessary for the successful accomplishment of such an operation should be conducted at the division level. The practices developed during this war were non-uniform and were generally attributable to the low experience level of division engineers and the insufficiency of the division engineer personnel.

37. The practice of making bridge unit commanders responsible for the construction of bridges under combat conditions was dictated by a deficiency of training in the combat engineer units. The practice was unsound and the roles of these units should remain as outlined in the present doctrine.

38. Naval and Harbor Craft equipment proved valuable during the major river crossings in the European Theater. The limitations on the employment of this equipment were too great. Organic equipment of engineer bridge units should possess performance characteristics sufficient to meet all requirements for water borne operations in the interior.

39. The practice of assigning dry bridging equipment to the division was sound and this equipment should be made organically a part of the divisional engineer component.

SECTION 8

RECOMMENDATIONS

40. It is recommended that:

a. Modifications of the present doctrine be limited to giving additional emphasis to:

(1) The necessity for a complete clean-up of the bridgehead areas by infantry elements.

(2) The advantages to be gained from river crossing

operations conducted during a sustained advance or a pursuit.

b. The design characteristics of river crossing equipment organic to engineer bridging units be sufficiently high to meet all requirements within a theater of operations.

c. Dry bridging equipment of the treadway type be made organic to all divisions on a basis of approximately 100 feet per infantry division and 300 feet per armored division.

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CHAPTER 3

AMPHIBIOUS LANDINGS, ASSAULT PHASE

SECTION 1

INTRODUCTION

41. Purpose. This is a study of the removal of underwater and beach obstacles during the assault phase of the three major amphibious landings on the north and south coasts of France.

42. Scope. The report covers the planning and training phases as well as the actual assault.

43. Background. FM 31-5, "Landing Operations on Hostile Shores", states in part: "the Navy is responsible for the breaching and necessary removal of all obstacles seaward of the normal ground point of landing craft at the time and place of landing. The Army is responsible for all obstacles inshore of that ground point. In execution, each service must be prepared to render complete mutual assistance to the other."

"Assault and destruction of fortified weapon emplacements and other shore defense installations after passage of beach obstruction is accomplished in accordance with the principles for attack of fortified positions....."

For the operation on the north coast of France a joint agreement dated 10 February 1944, between the Commanding General of the First United States Army and the Naval Commander of Task Force One Two Two, elaborated on the basic principles of FM 31-5. Annex A to this agreement states: "The Naval Force is responsible for the breaching and removal of obstacles which are under water at the time of removal if required. Responsibility for removal of obstacles not under water rests with the Landing Force (Ground Troops). Each service must be prepared to render mutual assistance to the other."[1]

In the case of the operation on the south coast of France no written agreement was made to fix separate responsibilities for each service beyond those stated in FM 31-5. To coordinate their responsibilities the Army and Naval Commanders created a Beach Obstacle Board. This board included appropriate Army and Navy staff officers and was headed by an engineer officer.[2]

These procedures formed the basis for joint Army-Navy planning for the assault phase of the proposed landings.[4] In each major assault the removal of all obstacles was considered a joint responsibility.[3]

44. Plans for Assault. In each army, plans for the development of assault methods centered in the office of the Engineer.[7] The beach assault methods selected were based on previous operations and experimental developments. Each army planned to select the most promising assault means, and then in conjunction with training to be conducted under the supervision of amphibian training centers and appropriate members of planning staffs, to determine the best method for their employment.[4] Prior to the publication of operational directives each theater had established amphibian training centers[7] for this purpose commanded by a general officer of the Corps of Engineers and operated in conjunction with the Navy.[4] Also the United States War Department through the Engineer Board operated the Joint Army-Navy Experimental

and Testing Board at Fort Pierce, Florida,[3] and the British War Office conducted its own training and research centers in conjunction with the Royal Navy in England.[5]

SECTION 2

RECONNAISSANCE OF OBSTACLES

45. Air Observation. Air observation in the form of photo coverage was the primary source of combat intelligence. Critical areas were repeatedly photographed both for vertical and oblique coverage.[8] Much of this photography was at extremely low level to assure so far as possible that all minefield and underwater obstacles were detected.[8] In this connection it is important to note that, from a naval point of view particularly, beach obstacles include all natural hazards to landing craft as well as man-made defenses. The detection of submerged rocks and offshore sand bars, or strong tidal cross currents, is vital to assault planning.[9] In general air observation determined the location and character of both enemy and natural obstacles and was a continuous operation up to D-Day.

46. Ground Observation. To supplement air observation and to provide against successful camouflage, dummy installations, and erroneous photo interpretation, ground observation was employed. Ground observation was of two types, from within, and from the sea. Information from within furnished valuable intelligence including details of such obstacles as sea walls and barbed wire entanglements, and number and position of road blocks in critical seashore villages. This source also furnished valuable data on the composition and dimensions of underwater obstacles. Information from the sea, was obtained primarily by naval personnel.[9] These parties operated from submarines and small craft under cover of darkness and were particularly successful in locating natural navigation hazards including offshore bars.[9]

47. Other Methods. Normal espionage channels provided considerable excellent information on enemy obstacles. Old photographs of French towns, ports, and beaches were solicited from private collections. Prisoners of war were carefully interrogated and expatriated residents of target areas were interviewed.

SECTION 3

DEVELOPMENT OF TECHNIQUE AND TRAINING

48. Development. As latest reconnaissance revealed new obstacles, a constant program of development of new means of assault was conducted in the zone of the interior by the joint Army-Navy Board in Florida.[3] A variety of different means was developed. It was appreciated, however, that no one means would prove best for all circumstances, since the effectiveness would vary with the tactics to be employed, the location of the assault, and the conditions existing there at the time. Also, that regardless of how the methods were rated in effectiveness by the development board, the choice of methods (and equipment) to be used in any assault was up to the commander responsible for the success of the assault. It was not practical in the zone of the interior to test the means developed under the conditions to be encountered[3] nor to demonstrate them to responsible assault commanders. This work had to be conducted within the theater.

In England the testing of the means developed in the zone of the interior and demonstration of their use under local conditions was conducted by the Assault Training Center under the direction of the Theater.[10] In the Mediterranean Theater this responsibility was placed on the Task Force and carried out by a joint Army-Navy Board appointed by the Army and the Naval Task Force Commanders.

49. Liaison with the Zone of the Interior. The First United States Army maintained liaison with the United States for general engineer intelligence through the Liaison Section of the Intelligence Division of the Engineer Section, European Theater of Operations, United States Army, which also maintained liaison with other Allied agencies, with particular reference to experimental equipment, materials, and new methods.[11]

Seventh United States Army liaison with the zone of the interior was maintained through the Engineer, North African Theater of Operations, United States Army, who obtained continuous reports from the joint Army-Navy Board in Florida. Early in 1944 a representative of the Beach Obstacle Board proceeded to the United States to visit the experimental station at Fort Pierce and to obtain first hand information on new materials and equipment. An officer familiar with the work at Fort Pierce was sent to North Africa to assist in Seventh Army experimentation.[3]

50. Preliminary Decisions on Assault Methods. Preliminary decisions affecting engineer assault methods made in the spring of 1944 in the zone of the interior as the result of study and experiment were:

a. Adequate minefield and obstacle clearance by naval gunfire, rocket craft, or aerial bombardment was impractical.

b. The Ready Fox, an oversized, floating bangalore torpedo, offered great promise for the clearance of underwater obstacles, but was almost impossible to handle in rough water.

c. Naval demolition craft were effective, but uncertain in actual operations.

d. A dependable waterproof fuse igniter was available.[3,12]

51. Demonstrations to Assault Commanders. A number of demonstrations were held for the First United States Army and the British Force in the spring of 1944 to illustrate the effectiveness of both manual and mechanical assault techniques.[4,10] The outstanding initial demonstration of mechanical devices was held at Saxmundham in February 1944, where the 79 Armored Division (British) demonstrated the use of mechanical equipment in mutually supporting teams following a predetermined "drill".

Seventh United States Army in conjunction with the amphibian training center constructed a typical enemy beach at Salerno, Italy, in July 1944 and staged comprehensive demonstrations of all available beach assault equipment for assault commanders. These demonstrations included naval demolition craft, and armored tank gapping teams operated similarly to British practice.

52. Decisions on Methods and Equipment to be Employed. Decisions reached as a result of experiments and demonstrations were:

a. First United States Army:[12]

(1) Naval Combat Demolition Units supplemented by combat engineer soldiers, all trained in demolition with hand placed charges, would be responsible for demolition of seaward obstacles.

(2) Primary reliance for demolition of beach obstacles would be placed on specially trained engineer teams utilizing hand placed charges.

(3) Divisional engineers should clear lanes through minefields, assault emplacements, and breach walls by standard methods as required for passage of their own assault echelons from the high water mark inland.

(4) Beach obstacle clearance demanded mutual support and should be conducted under Army command, this to include the naval demolition units.

(5) To utilize DD tanks as a primary source of close-in gunfire support for beach assault.

b. Seventh United States Army.[3]

(1) Naval Combat Demolition Units supplemented by shore engineer soldiers should be responsible for the removal of underwater obstacles.

(2) Primary reliance for demolition of beach obstacles should rest with specially trained shore engineer teams.

(3) Initial beach minefield lanes should be cleared by sand plow tank dozer teams. These teams should be prepared to blow gaps in beach walls with bulk explosives carried inside their tanks.

(4) To place main reliance on tanks lifted in LCM's and artillery mounted in DUKW's for initial close gunfire support on shore.

(5) To make DD tanks available to Task Force Commanders who desired to utilize them to supplement artillery lifted in LCM's.

(6) To utilize tank mounted rocket launchers for assault of emplacements.

c. British Force.[9]

(1) Responsibility for the removal of underwater obstacles should be placed on Naval Landing Craft Obstacle Clearance Units consisting of one officer and nine seamen each, assisted by the Royal Engineers.

(2) The removal of beach obstacles should be placed on Royal Engineer Field Companies using hand placed charges, assisted in turn by naval personnel.

(3) Special tank teams should be used to pass obstacles beyond the high water mark; flails or "Scorpions" to clear lanes through minefields, tank mounted or tank towed bulk charges to breach sea walls, and AVRE Churchill tanks for the assault of emplace-

ments by engineer troops utilizing flame throwers and bulk explosives carried inside the tank.

(4) To utilize DD tanks and tank weapons of mechanical gapping teams to support the initial infantry assault.

53. Training Facilities Set Up and Training Accomplished. In the First United States Army, amphibian training and obstacle demolition training of small units up to regimental combat team size were conducted at the Assault Training Center. Subsequently combined exercises for larger units up to divisional task forces were held by V and VII Corps at Slapton Sands under First Army supervision. These exercises in their final stages were elaborate and realistic, involving preloading by Services of Supply, embarkation control by Transportation Corps, air support with actual bombing missions by fighter and medium aircraft, and naval fire support adjusted by naval shore parties. Training was comprehensive and covered all assault troops, including Rangers, as well as many service units. The period involved included the winter of 1943-1944 and spring of 1944 for small unit training. Major exercises were conducted in the period 27 April 1944 to 8 May 1944.[16]

Training in the British Force developed along parallel lines during the same period at separate installations.[9]

In the case of Seventh United States Army, training facilities for the three assault divisions were established in Italy for simultaneous operation, utilizing the amphibian training center moved from Africa for that purpose. Each division was issued necessary amphibian supplies and completed what was by that time an established schedule of small unit boat team training, regimental combat team landing exercises, and finally full scale water borne division task force exercises, for which token quantities of all types of combat and service equipment were loaded. Training accomplished was complete for all units scheduled to participate directly in the assault.

SECTION 4

THE ASSAULT

54. Commanders' Decisions as to Time of Day.

a. Normandy. In the landings on the Normandy Coast the tide was a paramount consideration. The final decision was to assault soon after daylight, at mid-tide, on a rising tide. It was hoped that this would result in the following advantages:[9]

(1) Expose, or partially expose, all obstacles initially to first assault craft thereby minimizing losses.

(2) Enable demolition parties to work in little or no water on the seaward band of obstacles, and proceed inland with or ahead of the tide destroying successive bands.

(3) Reduce the distance from grounding point to dune line to a minimum with corresponding reduction in casualties on the open beach.

(4) Reduce to a minimum the danger of encountering deep

water "runnels" between grounding point and high water mark.

(5) Limited visibility of early morning would reduce effectiveness of fire from beach installations.

(6) Troops would be landed at the proper points.

(7) An hour of daylight prior to H-hour would enable the Air Force to silence enemy beach emplacements with one final drenching bombardment.

(8) Naval bombardment and fire support would be most effective.

b. Southern France. The initial major decision by the Commanding General Seventh United States Army was to make a daylight landing. All previous deliberate amphibian assaults in the Mediterranean Theater had been made under cover of darkness. A daylight landing assured:

(1) Maximum effectiveness of preliminary naval and aerial bombardment.

(2) Maximum probability of landing by initial assault waves at proper beaches.

(3) Maximum control by small unit commanders.

(4) Effective naval fire support after H-hour.

(5) Prompt development of beaches and rapid buildup.

(6) More effective dealing with beach obstacles.

55. Methods Employed.

a. Each army trained its assault infantry and divisional engineers to attack on foot by boat teams from the debarkation point to the first phase line. Assault troops were equipped to open foot paths through minefields, blow gaps in wire with bangalore torpedoes, and assault pillboxes using pole charges and flame throwers; their primary mission being to get forward as rapidly as possible. Separate troops were assigned to open lanes from deep water, across the beaches and through whatever obstacles were found, so that craft could land and debark vehicles.[13,17] This problem was handled differently in each Army.

b. The First United States Army relied on manual means supported only by tank dozers to remove underwater and beach obstacles. Teams trained and equipped for the removal of underwater obstacles consisted of five naval demolition men augmented by seven army demolition men lifted as a unit in one LCVP; teams for the removal of beach obstacles consisted of 25 men, some all engineer, some a combination of engineer and infantry, lifted as a unit in one LCM. Tank dozers were lifted separately in LCT's. All this personnel was organized into one provisional command.[12,13] Actually both type of teams were trained to cooperate beginning on the two seaward band of obstacles, then to leap frog to alternate bands as they proceeded inland opening a lane 50 yards wide to the high water mark. Subsequently traffic lanes were to be opened over the dunes as rapidly as possible assisted by tank dozers.[13]

c. The British Forces employed a combination of manual and mechanical means to gap both underwater and beach obstacles. The manual teams to eliminate the underwater obstacles consisted of one naval officer and nine seamen lifted as a unit in two LCT's. Teams to gap beach obstacles consisted of a Royal Engineer Field Company per brigade, lifted in the same LCT's that transported the mechanical teams. The mechanical means employed by the British were the most elaborate of the three landings. They consisted of armored vehicles, (flails mounted on Sherman or Churchill tanks and other armored engineer vehicles with a variety of gadgets) lifted in teams of three or more, on LCT's.[14]

Their procedure depended on the naval teams to open sufficient gaps to permit initial craft to unload. Armored vehicles of mechanical gapping teams were to drive straight inland, flails leading, opening traffic lanes through minefields, sea walls, and over tank ditches, utilizing their special devices. The Royal Engineer Company was to assist in removal of obstacles offshore working from the beach, clear the beach proper, and supplement the work of mechanical gapping teams inland.[14]

d. Seventh United States Army also employed a combination of manual and mechanical means. The manual teams for the destruction of underwater obstacles consisted of a naval officer and five seamen augmented by five soldiers from the shore engineers, all lifted in one LCVP. The manual teams for the removal of beach obstacles were units of 12 soldiers from the shore regiments lifted in one LCVP. Mechanical means employed were based on tank dozers operating in pairs.[3]

Gapping procedure was to be initiated by the naval demolition team which relied on radio controlled boats filled with explosives for the destruction of underwater obstacles prior to the assault landing. Gaps would then be widened to 100 yards by hand placed charges. Manual teams were to debark, clear the beach proper, blow sea walls, assist in removal of underwater obstacles, and improve lanes opened by gapping teams. Tank dozer teams were to drive inland clearing minefields with sand plows, filling ditches by dozing and destroying obstacles by gunfire, rocket fire, or bulk charges hand placed.[3]

56. Effectiveness of Ground Assault.

a. In the First United States Army assault, the VII Corps landing was not heavily contested and obstacles were cleared on schedule. The V Corps landing was heavily opposed and obstacles were not successfully cleared on the initial tide.[4] Numerous obstacle removal teams were landed east of the beach proper. Heavy casualties estimated at 41% were sustained.[4] DD tanks "did not materialize" and preliminary naval and aerial bombardment was not effective.[4,12] In all, five narrow gaps to the beach were cleared on D-Day. Of these only one was used.[4] During the flood tide period all able personnel joined in the fire fight and craft crashed through the obstacles accepting the losses incurred. This procedure was remarkably successful. Satisfactory gaps were opened up on D plus 2. The delay was due to wrecked craft as well as enemy opposition.[4]

b. On British beaches very little was accomplished on the first tide due to an unexpectedly high onshore wind, which increased the depth of the water beyond that expected, and intense enemy opposition. DD tanks were able to land however, and here also landing craft crashed through obstacles to debark mechanical gapping teams. This armor on the beach neutralized the enemy fire so that, when the tide permitted, effective gaps were cleared promptly.[14]

c. In Southern France opposition was stunned by preliminary bombardment both air and naval in most landing areas. Underwater obstacles were not continuous on all beaches and were avoided when possible. Clearing teams completed gapping operations on schedule. The haze resulting from the bombardment was distinctly helpful. DD tanks and tank dozers performed their missions satisfactorily.3

57. Effectiveness of Mechanical Devices.

a. In Normandy on the VII Corps and British beaches DD tanks and armored gapping teams landed successfully and were of great value in overcoming initial resistance.13,14 The equipment justified its use, contributing in great degree to the rapid removal of tetrahedrons, blowing of walls, filling ditches and gapping minefields. On the V Corps beach only six of 16 tank dozers reached the beach. These tanks fought effectively until all but one was shot out of commission. DD tanks "did not materialize".4

b. In the Seventh Army's assault the attempt to utilize explosive boats on the most heavily obstructed beach was unsuccessful. DD tanks landed successfully and spearheaded the advance for many miles inland. A few tank dozers were drowned out on debarkation; the remainder performed exceptionally well for minefield gapping, demolition of walls, filling ditches and as combat armor.3

58. Effectiveness of Naval Bombardment. Naval bombardment prior to assault was ineffective for the removal of obstacles. This was particularly true of area bombardment whether by guns or by rocket craft. Preliminary naval fire did not silence well emplaced guns manned by determined crews, nor appreciably reduce the effectiveness of shore defense obstacles.12 However, once fire control parties of naval personnel got ashore to adjust fire accurately, it became very effective. Under these conditions defilade was the only serious problem. Naval rockets are directed by aiming the craft itself, and under conditions of poor visibility became hazardous to friendly troops and craft. Although such rockets did produce terrific shock effect on personnel, they were not effective against obstacles.3

59. Effectiveness of Aerial Bombardment in Removal of Obstacles and Minefields. Preliminary aerial bombardment of landing areas was not uniformly effective for the removal of obstacles.12 Where wire alone existed, the blast did clear the wire, but where mines were present, it actually rendered the gapping more difficult, time consuming and dangerous.3 Obstacles, such as sea walls, can be removed when attacked individually if bombers are directed by observers near the target. It is not feasible to carry out such special gapping operations during the assault proper.

60. Effectiveness of Landing Time Chosen.

a. All evidence indicates that the daylight assault is preferable to a night assault for a large scale attack, where local air superiority can be assured, where beaches are known to be defended, and it is essential to develop maximum covering firepower against these defenses. It also enables the attacking force to locate the correct landing areas more accurately, which was a primary consideration in the European Theater.

b. Attacking at mid-tide on a rising tide is equally sound, as was demonstrated at Utah Beach and by the British assault. The difficulties that developed at Omaha Beach insofar as clearing beach obstacles is concerned were due to intense enemy opposition and to the fact that the DD tanks were launched so far from shore that the losses were excessive.12

SECTION 5

CONCLUSIONS

61. The following conclusions have been reached:

a. Special assault teams are necessary in a major amphibious operation to provide passage of assault forces through underwater and beach obstacles.

b. Obstacles are most effectively assaulted by manual means supplemented by mechanical means.

c. Preliminary aerial and naval bombardment are not effective for the removal of beach obstacles or for clearing minefields.

d. An early morning daylight assault, timed to take maximum advantage of the shock effect of naval and aerial bombardment of the dune line, offers the best chance of success when local air superiority is assured.

e. In an amphibious landing the removal of underwater obstacles is a minor phase of the naval operations and a major phase of the army operation.

f. An agency is necessary to develop continuously new means of assault as new obstacles appear and to establish proper methods of employment of those means. A board to develop the means should operate in the zone of the interior where it has the manufacturing resources of the United States at its disposal. A board to develop the best methods of employment of the means can only function properly in the theater where it has complete familiarity with the conditions to be encountered and the tactics to be employed. Therefore, a single agency will not suffice and development boards are necessary both in the zone of the interior and in the theater and the closest liaison between them is essential.

g. Operation of a theater board should be a theater responsibility. The mission of the theater board should be to: maintain close liaison with the zone of the interior board; offer suggestions to the zone of interior board in order to guide its efforts so they will reflect the requirements of the theater; test the means developed and prescribe proper methods for their employment; demonstrate both to responsible tactical commanders at appropriate times.

SECTION 6

RECOMMENDATIONS

62. It is recommended that:

a. Manuals and service school teachings include the missions, proper organization, and the methods of operation of special assault teams to pass underwater and beach obstacles.

b. The removal of underwater obstacles continue to be a joint army-navy responsibility, but that doctrine provide that command of all obstacle removal units in the assault be an army responsibility.

c. Development of mechanical devices to assist with removal of underwater and beach obstacles be continued.

d. Manuals indicate that the establishment of an agency to develop constantly up-to-date means and methods of assault in order to keep abreast of new enemy defensive measures is an essential theater function.

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CHAPTER 4

AMPHIBIOUS LANDINGS, SUPPLY PHASE

SECTION 1

INTRODUCTION

63. Purpose. To review the general planning, organization, and execution of the supply phase of the United States landings on the north and south coasts of France, particularly to determine the proper relations of the commanders and units of the various echelons and to point out deficiencies in the procedures.

64. Scope. This report covers the organization, planning, and execution of the operations conducted by First United States Army and by Seventh United States Army from the shore engineer viewpoint. A statistical study of the supplies handled is not included.

65. Basic Principles. The following basic principles are emphasized:

a. Unity of command is essential.[1]

b. Organization and operation of shore logistic functions require specially trained and equipped personnel.[1]

c. Where plans contemplate the future use of beaches for port operations, continuity of the essential transportation and supply functions must be assured.[1]

d. Special engineer shore regiments, when available, are competent to perform all beach duties but will normally require the addition of other service units to complete all the functions assigned to the shore group.[1]

SECTION 2

FIRST ARMY OPERATION

66. Organization. As the nucleus for an organization to perform its over-the-beach supply functions the First Army was provided an engineer shore regiment and two amphibiously trained engineer combat groups.[2] Around these three units the First Army built its organization. One shore unit, the 531 Engineer Shore Regiment, which with its attached units was capable of supporting a reinforced division, was provided to the VII Corps to perform its over-the-beach supply function. Over this unit was superimposed the headquarters and headquarters company of the 1 Engineer Special Brigade.[3]

The other two units were allotted to the V Corps. They were also augmented by additional units to the extent that each was capable of supporting a reinforced division. They were redesignated the 5 and 6 Engineer Special Brigades. Over these two headquarters was placed a provisional engineer special brigade group headquarters which originally consisted of 14 officers and 15 men, but finally of 65 officers and 242 men. Later the 11 Port of the Transportation Corps with attached units, which had been operating the Bristol Channel ports, was also attached to the provisional engineer special brigade group.[4]

No command headquarters to control the over-the-beach supply at army level was provided.

67. Planning. First Army controlled the mechanics of supply through a joint agreement which was signed 10 February 1944, by the Commanding General, First Army, and the Commander of Naval Task Force 122, and through the directives in its plan of 25 February 1944.[5] The purpose of the former was to clarify army and navy responsibility during the operation. The latter stated that the 1 Engineer Special Brigade would support VII Corps and a provisional engineer special brigade group would support V Corps. The joint agreement (Appendix 1) is a clear statement of responsibility and enjoins all echelons to cooperate to the utmost. However, it does not indicate clearly how the cooperation is to be accomplished other than by liaison officers. The channel of command for the control of the unloading is not stated. Thereafter the planning of the mechanics of the over-the-beach supply was decentralized to the two corps. The joint agreement mentioned above was modified on 20 May 1944 to provide that the commanding general of each corps would command all units ashore within his respective area until the First Army was established ashore.[5]

Subsequent to the completion of First Army's plan, navy planning was conducted at Plymouth in conjunction with representatives of the First Army. Corps and division staffs and the Advance Section, Communications Zone, also entered into the planning at this stage.[6]

First Army plans contemplated that army service troops attached to the engineer special brigades would help to operate the beach maintenance area dumps until approximately D plus 12, when the responsibility for dump operation would be transferred from the special brigades to First Army services under Army G-4.[4] It was planned that Advance Section, Communications Zone, would gradually work its personnel into the beach dumps and take over all supply functions when an army rear boundary was established about D plus 20. Later Advance Section, Communications Zone, was to be relieved of this responsibility by Communications Zone about D plus 41. This transfer involved a major turnover of troops assigned to operate the dumps.[4] Thus during the first 41 days of operation the responsibility for the operation of the supply dumps in the beach maintenance areas was planned to be the successive responsibility of the Engineer Special Brigades, Army (G-4), and Advance Section, Communications Zone, followed on D plus 41 by the Communications Zone.[4] The provisional engineer special brigade group and the engineer special brigades under corps direction each completed and published their plans early in May.[3,4]

68. Execution. In the actual execution, while the operation of the 1 Engineer Special Brigade proceeded according to plan,[3] that of the provisional brigade group did not, and the overall supply operation fell behind schedule. Evidence indicates that this was due basically to the following factors. First there was no organization to provide central control over the entire over-the-beach supply operation. Information on the location of supplies offshore was lacking because the necessary manifests were not available.[4] In addition naval communications and traffic control were inadequate and the mass of craft and shipping was not adequately controlled. The situation was aggravated on the V Corps beach because of the unwieldly organization of the provisional brigade group and the fact that circumstances had prevented the proper training of its personnel.[4] Also a great deal of effort and attention was devoted to the construction of the artifical harbor. Despite all these difficulties approximately 206,000 tons of supplies were unloaded during the first 20 days.[3,4]

Army service troops operating under the special brigades inaugurated the initial dumps as planned. Direct control of their operation passed to Army (G-4) on D plus 3, earlier than scheduled, and was retained by army until about D plus 20. From then until D plus 40 army retained indirect control through Advance Section, Communications Zone. On D plus 20 Advance Section, Communications Zone troops replaced the army troops operating the dumps and were in turn replaced about D plus 40 by communications zone troops, when Advance Section, Communications Zone, was pulled forward in anticipation of advance by the army. This thrust personnel into the operation of the beach supply dumps who were unfamiliar with the situation. Considerable confusion resulted.[3]

SECTION 3

SEVENTH ARMY OPERATION

69. Organization. The Seventh Army had at its disposal for over-the-beach supply two engineer combat regiments of three battalions each and one of two battalions. The latter was reinforced by attaching to it an additional combat battalion. These formed the nucleus for three engineer shore groups, to which were attached the service elements necessary for the operation.[7] An engineer special brigade headquarters was not available to Seventh Army for control of the over-the-beach supply operation at army level. To provide the necessary command headquarters the Commanding General, Seventh Army, organized a "Beach Control Group" commanded by an officer of the engineer section of the army headquarters. The control group's general staff consisted largely of Seventh Army staff officers who had participated in the planning for the operation for several months and also included the senior naval officer ashore and his staff. The control group's special staff was drawn from officers of the future base section in order to insure the maximum continuity in the transfer of supply functions.[7]

The engineer shore groups when reinforced, were generally equal in composition and strength to the special brigades employed in Normandy.[4,7] Regimental staffs were supplemented by officers from the future base section but there was no redesignation and no use made of provisional units other than the beach control group. Each shore group was to support initially one reinforced assault division.[7]

70. Planning. Planning for the over-the-beach supply was based on an agreement with the navy drawn up in February 1944 and published in June 1944. This agreement, "Combined Beach Operations Plan" (Appendix 2) was specific as to the system to be used to insure the necessary coordination between the services. Responsibility for the supervision of the over-the-beach supply was centered in one organization, the Seventh Army Beach Control Group. The chain of command for controlling the unloading operations was specified. The mechanics for insuring the location of supplies offshore through the ships manifest was clearly stated. The naval plan to control unloading operations through the naval component of the Beach Control Group staff was indicated. Naval planning was conducted at Algiers in the same headquarters with the Seventh Army until the early part of July. At that time both the army and navy planning staffs were transferred to Naples. The base section also maintained a varying number of personnel at Seventh Army headquarters to coordinate their plans with army's.

Responsibility for the operation of beach dumps was to be retained by the Beach Control Group from the time they were taken over from the assault divisions until they were to be turned over to the base section about D plus 30. Initially it was planned to operate

the beach dumps with army personnel attached to the beach groups for that purpose. These were to be supplemented by base section groups who would continue the operation of the dumps after the army troops were withdrawn.7

71. Execution. In southern France the actual operation of the beaches developed as planned. As soon as the assault divisions were established ashore, control of the three shore groups passed to the Beach Control Group, which retained complete responsibility for the over-the-beach supply and the operation of the beach dumps until D plus 20 when this responsibility passed to the base section commander.7 The transfer was accomplished by withdrawing the remaining Seventh Army personnel from the Beach Control Group and the engineer combat regiments and army service units from the beach maintenance areas. The base section assumed command utilizing its own officers already present in each of the four headquarters and for the most part the same troop units already assisting in the unloading and dump operations.7 Separate base section units were utilized to complete opening of the port of Marseille, already initiated by the army, until unloading operations could be transferred completely thereto and beach maintenance areas depleted by issue. When the transfer to the base section took place on D plus 20, approximately 255,000 tons had been unloaded over-the-beaches.

The base section had hardly been established in Marseille before the army lines of communication had become so extended that it was difficult for the base section to meet its supply responsibilities. The original base section, including its operating personnel, was therefore moved to the Dijon area to operate as an advance section and a second base section replaced it in Marseille. The unfamiliarity of this personnel with the local supply situation complicated the furnishing of supplies to Seventh Army.

SECTION 4

CONCLUSIONS

72. The following conclusions have been reached:

a. A headquarters at army level is necessary to exercise over-all command of the over-the-beach supply operation.

b. There was a supernumerary beach supply headquarters on the beaches in Normandy. Either the 1 Engineer Special Brigade or the Provisional Engineer Special Brigade Group should have been eliminated and the remaining headquarters placed in over-all command.

c. An adequate system to insure that the necessary records (manifests) reach the interested army and navy headquarters must be clearly established during the planning if the flow of supplies from ships to shore is to be properly controlled.

d. Mechanics for effecting liaison must be clearly stated in the planning. It is essential that the routing of landing craft (and DUKWs) be centrally controlled in accordance with a clear cut chain of command, well understood prior to the assault.

e. In a major amphibious invasion simplicity should be stressed in the shift of supply responsibility. It should be decentralized only to the assault (division) commanders, and to them only until the success of the assault is assured. Thereafter it should be retained by the task force (army) commander and pass directly from him

to the ultimate responsible (communications zone) commander in order to insure "continuity of the essential transportation and supply functions".

f. Communications zone personnel should be integrated into the army supply picture as early as possible before the shift of responsibility to insure continuity of operations.

g. The personnel used initially by the communications zone for the operation of beach dumps should, as far as practicable, be the same personnel planned for their permanent operation. This should be done even though they function initially under a forward headquarters of the communications zone.

SECTION 5

RECOMMENDATIONS

73. Doctrine should provide that:

a. A joint agreement must be drawn up by the senior army and navy tactical commanders at the start of planning to amplify the provisions of FM 31-5 and allied manuals. This agreement must be a clear cut statement prescribing in detail the mechanics to provide adequate control of the priorities for unloading and the routing of craft (and DUKWs) and of insuring the prompt delivery of the necessary loading information (manifests) to the interested army and navy commanders.

b. Simplicity in the transfer of supply responsibility must be insured.

c. Shore troops should be attached to divisions for the assault but revert to army control as soon as the success of the assault is assured.

d. The initial communications zone headquarters to assume supply responsibility should utilize for the operation of beach dumps, the personnel planned for their permanent operation.

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APPENDIX 1

Chapter 4

10 February 1944

REG NO PG-586

JOINT AGREEMENT BETWEEN COMMANDING GENERAL FIRST US ARMY AND COMMANDER TASK FORCE ONE T"O TWO FOR AMPHIBIOUS OPERATIONS

1. The three basic principles of this joint action provide that in carrying out its functions neither service will attempt to restrict in any way:

a. The means and weapons used by the other service.

b. The area of operations of the other service.

c. Each service will lend the utmost assistance possible to the other service and avoid the use of weapons or areas where either service indicates interference in the natural element of that service.

2. The training task vests responsibility and authority as follows:

a. In the Naval Commander:

(1) To train Naval Beach Parties, small craft operators, and all other Naval personnel.

(2) To coordinate the amphibious training of the participating forces of both services when afloat in Exercises and Dress Rehearsals arranged between the Navy and Army Commanders or directed by the Supreme Commander, Allied Expeditionary Force.

b. In the Army Commander:

To train the Engineer Special Brigades and all other Army personnel except that Joint Amphibious training will be coordinated by the Naval Commander.

c. Naval and Army Commanders will each assign training missions consistent with total training missions, designate training objectives, provide suitable training areas and exercise such coordinating control as found necessary to insure the success of the amphibious training program to their own service.

3. Unless otherwise directed by the Supreme Commander Allied Expeditionary Force, command of the Army and Navy Forces of the Western Task Force, after embarkation will rest in the Naval Commander Western Task Force, under the principle of unity of command, until such time as the Commanding General, First U S Army lands and assumes command.

4. The spheres of responsibility as outlined in Annex "A" are hereby jointly approved.

O. N. BRADLEY
Lieutenant General, U.S. Army

ALAN G. KIRK
Rear Admiral, U.S. Navy

1 Incl: Annex "A"

- ANNEX "A" -

SPHERES OF RESPONSIBILITY IN AMPHIBIOUS OPERATIONS
ARMY - NAVY

1. In the preparation of plans and orders, both for amphibious training and operations, it is essential that there be the closest cooperation between the Army and Navy commanders who are to be associated in the projected operations. Officers on the staff of the Commanding General, First U S Army and the staff of Commander Task Force One Two Two should have a clear understanding of the problems confronting the other service and the limitations incident to the employment of the facilities of both services. The staffs of both commands should study the problem together. This applies equally to staffs of the subordinate commanders who are to be associated in the operations. Technical details relating to each service are to be worked out by the service concerned. Liaison officers are exchanged between the services as required.

2. RESPONSIBILITIES FOR LOADING PERSONNEL, VEHICLES, AND SUPPLIES AT PORTS, HARDS, AND QUAYS IN THE U.K.

a. The movement of personnel, vehicles, and supplies to ports (Points of embarkation as required by the Landing Force Commander) is the responsibility of the SOS, ETOUSA.

b. Personnel.

(1) The allocation of Army units to ships and craft is the responsibility of the Army. The allocation should be made in consultation with the Navy to insure that the desired load and the loading schedules are practicable, and the craft suitable from a naval point of view.

(2) The allocation to troop space aboard ship is the responsibility of the Army. The allocation should be worked out in consultation with the Navy to insure that it is within the capacity of the ship and that the troops are distributed to facilitate debarkation.

(3) The embarkation of troops is the responsibility of the SOS, ETOUSA with agreement of the Naval representative.

c. Cargo-Vehicles.

(1) The allocation of vehicles and supplies to ships for the assault is the responsibility of the Army. The allocation should be worked out in agreement with the Navy in order to insure that the capacity and required battle trim of the ships is not exceeded and that safety precautions are complied with.

(2) Priority for discharge of vehicles and cargo is established by the Army.

(3) The stowage plan of cargo and vehicles is the responsibility of the Army. The stowage should be worked out in agreement with the Navy in order to insure that the capacity and battle trim of the

ship is not exceeded and that safety precautions are complied with.

(4) Loading is the responsibility of the Army, subject to overall supervision by the Navy and approval of the vessel's Commanding Officer, in order to insure that the capacity and required battle trim of the vessel is not exceeded and that safety precautions are complied with.

(5) Stowage and securing of all vehicles and cargo is the responsibility of the Army, as directed by the Commanding Officer of the vessel.

(6) The loading of cargo ships or craft is the responsibility of SOS, ETOUSA.

d. Movement of vessels to and from berths, quays or herds is the responsibility of the Navy.

e. Subsequent movement of vessels is the responsibility of the Navy.

3. RESPONSIBILITY FOR DISCHARGE AT THE BEACHES.

a. The beaching and berthing of all vessels is the responsibility of the Navy.

b. Time to commence discharge from vessels is determined by the Navy in compliance with the Army's scheme of maneuver.

c. The order of debarkation is the responsibility of the Army and is carried out by the Navy in compliance with:

(1) Boat assignment table (prepared by Army in agreement with Navy).

(2) Landing Diagram (prepared by Army in agreement with Navy).

(3) Boat approach schedule (prepared by Navy).

d. Cargo.

(1) The responsibility for the discharge of cargo in accordance with established priorities is as follows:

(a) From APA and AKA to landing craft, lighters, or docks -- Navy. (Troops embarked for this specific purpose are furnished by the Army. Booms and winches in Naval vessels will be manned and operated by the Navy).

(b) From coasters, merchant ships, etc., to landing craft, lighters, or docks -- Army.

(c) From landing craft to beaches or docks -- Army. (Booms and winches in Naval vessels will be manned and operated by the Navy).

(2) Clearance of cargo across the beaches is the responsibility of the Engineer Special Brigade under the direction of the CG, First U S Army, until the

beaches are taken over by the Communications Zone.

(3) The movement to dumps inland is the responsibility of Engineer Special Brigade.

e. The authority for the release of ships or craft from beach, anchorage, or berth rests with the Navy. However, no ship or craft will be so released unless completely unloaded except upon prior concurrence of the Engineer Special Brigade Commander, or upon specific orders from the Naval Assault Force Commander, or other higher Naval or Army Commander.

f. The authority to stop unloading in emergency from Naval ships and craft rests with the Navy - from Merchant Ships with the Army.

g. Subsequent movement of all vessels after clearance from the beach or berth is the responsibility of the Navy.

4. RESPONSIBILITIES OF ENGINEER SPECIAL BRIGADE, INCLUDING NAVAL BEACH PARTY.

a. Shore Party.

(1) The Engineer Special Brigade together with the attached Naval Beach Party in an organization specifically trained and equipped for the technical organization of beaches to facilitate landing and movement of personnel, equipment, and supplies on and over the shore line to beach dumps, to establish and maintain communications and to evacuate casualties and prisoners of war to ships and craft. It is composed of Army and Navy elements, and is commanded by an Officer (Army) known as the Shore Party (Engineer Special Brigade) Commander.

(2) This command is exercised under the authority and responsibility of unity of command as defined in "Joint Action of the Army and Navy."

(3) The Shore Party (Engineer Special Brigade) Commander is vested with the responsibility and authority to coordinate the operations of the Army and Navy elements by the organization of task forces, the assignment of missions, the designation of objectives, and the exercises of such coordinating control as he deems necessary to insure the success of the operation. (Joint Action of the Army and Navy, Par. 10a.).

(4) Unity of command does not authorize the commander exercising it to control the administration and discipline of the forces of the service to which he does not belong, nor to issue any instructions to such forces beyond those necessary for effective coordination. (Joint Action of the Army and Navy, Par. 10b.).

(5) Each service is responsible for equipping its elements of the Engineer Special Brigade in accordance with its approved tables of allowances.

(6) On shore the Army (Engineer Special Brigade Commander) is responsible for the berthing, messing, and medical care of the Engineer Special Brigade, or detachments thereof, including Naval personnel.

(7) On board ship the Navy (Commanding Officer of the ship) is responsible for the berthing, messing, and medical care of the Engineer Special Brigade, or detachments thereof.

b. Beach Party.

(1) The Commander of the Naval Element of an Engineer Special Brigade is known as the Beachmaster. The title is modified by the words Battalion, Brigade, or Division, according to the combat unit which his element serves. He acts as Naval assistant to the corresponding Commander in the Engineer Special Brigade, commands Naval troops in the performance of strictly naval tasks, and acts as advisor on naval matters. He is responsible directly through the beachmaster chain of command, to the senior beachmaster present, as the naval representative of the Naval Assault Force Commander, on Naval matters. (See c (1), (a), (b), (c), (d), (e), (f), and (2) (g) below).

(2) The senior Beachmaster present in any landing area is responsible for the proper functioning of the beach parties in that landing area, including the rapid and safe clearing and turn around of landing craft at his beaches, or other places of landing.

(3) The senior Beachmaster present in any landing area, as naval representative of the Naval Assault Force Commander, shall advise the Engineer Special Brigade Commander in that landing area, when in his opinion landing on a beach, or beaches, should be discontinued by reason of infessibility. This advice shall not be disregarded by the Engineer Special Brigade Commander. However, he may and should elect not to follow this advice if, in his opinion, the military situation is such as to make it necessary to accept the risks involved.

(4) When unloading is through any established port, the senior Beachmaster present shall act as harbor master, and shall make all arrangements and provisions for docking and undocking of vessels. His authority shall be complete with respect to his function as harbor master, until the Naval Assault Force Commander has directed his relief by the permanent naval port organization.

c. TASKS.

(1) The Engineer Special Brigade Commander, utilizing the attached Naval Beach Party personnel for the purpose, is responsible for the execution of the following tasks:

(a) Mark hazards to navigation in the vicinity of the beach and determine most suitable landing points.

(b) Effect emergency boat repairs.

(c) Care for beach casualties, and evacuate casualties to ships in accordance with Army and Navy Medical Plans.

(d) Control boat traffic in the vicinity of the beach.

(e) Direct landing, retraction, and salvage (emergency repair) of boats.

(f) Maintain communications with Naval task groups, and Naval vessels.

(2) The Engineer Special Brigade Commander is responsible for the execution of the following tasks:

(a) Mark landing beach limits with due regard to c (1) (a) above.

(b) Construct and maintain beach roadways and exit routes.

(c) Establish and mark debarkation points on landing beaches with due regard to c (1) (a) above.

(d) Unload supplies from ships and craft.

(e) Assist in removal of underwater obstructions.

(f) Clear beaches of mines and obstacles.

(g) Maintain liaison with senior commanders ashore and afloat.

(h) Erect enclosure for, guard and evacuate prisoners of war to ships in accordance with Task Force instructions.

(i) Establish Army communication within the brigade, with adjacent brigades and with other units ashore as required.

(j) Construct landing aids where required.

(k) Maintain order and direct traffic in the beach maintenance area.

(l) Provide bivouac, troop assembly, vehicle parking, and storage areas in the beach maintenance area for units crossing the beach.

(m) Regulate and facilitate movement of unit personnel and equipment across beach and insure the rapid movement of supplies into dumps.

(n) Select, organize and operate beach dumps for

initial reception and issue of supplies.

(o) Maintain records showing organization, material, and supplies by appropriate categories which have been landed on the beach.

(p) Provide for decontamination of gassed areas in the beach maintenance area.

(q) Maintain an information center for units landing.

(r) Operate emergency motor maintenance service to assist vehicles and equipment damaged or stranded in landing and requiring dewaterproofing assistance.

(s) Provide local security for beach maintenance area.

(t) Coordinate Army offshore activity.

d. Augment standard Engineer Special Brigade as deemed necessary for the special conditions of the proposed operation.

e. The Engineer Special Brigade with attached Naval Beach Party will operate under the Naval Task Force or Naval Assault Force Commander until the Commanding General, First U S Army, assumes command.

5. MULBERRY, GOOSEBERRY, NAVAL PONTON PIERS, AND CAUSEWAYS:

a. The planned location of all artificial harbor, harbor of refuge, naval ponton pier, and causeway installations shall be subject to agreement between the Commanding General, First U S Army and Commander, Task Force One Two Two.

b. Navy is responsible for cross-channel transit of all components.

c. Navy is responsible for placing all installations to seaward of the high-water mark.

d. Army is responsible for installations inshore of high-water mark.

e. Dock and pier installations in augmentation of the plan as of D-day shall be subject to separate agreement between Army and Navy.

6. MISCELLANEOUS.

a. Command of Assault or Ferry Craft.

(1) The officer or enlisted man in command of a landing craft is normally subject only to orders given him in his chain of boat command.

(2) In exceptional cases the senior naval line officer USN, or RN, taking passage in a landing craft may deem it necessary to assume command. The officer or enlisted man thus superseded should then obey orders given to him, but he should first point out if they

are contrary to the original orders he received, and he should draw attention to any navigational risks involved.

(3) If a senior officer of another service - either United States or British - who is taking passage in a landing craft, should wish to make a tactical redistribution before landing, he will state his requirements to the officer or enlisted man in charge of the craft. If these requirements are contrary to the original naval orders received, the officer or enlisted man in charge of the craft will so state and he will draw attention to any navigational or maritime risks involved. If the requirements are then confirmed, they are to be complied with, provided that the navigational and maritime conditions will, in the opinion of the naval officer, or enlisted man in charge, permit.

b. Defense of beaches and ports is the responsibility of the Army.

c. Naval mines of all types will be cleared by Naval forces as soon as this can be conveniently arranged after their discovery. The Naval Force is responsible for the breaching and removal of obstacles which are under water at the time removal is required. Responsibility for removal of obstacles not under water rests with the Landing Force (Ground Troops). Each service must be prepared to render mutual assistance to the other.

APPENDIX 2

Chapter 4

COMMANDER U. S. NAVAL FORCES
NORTHWEST AFRICAN WATERS

File No.
A4-3/N31/(163)

28 June 1944.

Serial: 00914

A. N. P. M. NO. 5

PART II

COMBINED BEACH OPERATIONS PLAN

The following plan has been drawn by N.C.W.T.F. and Commanding General, Force 163, and will govern beach operations during ANVIL.

1. Control of the Operations of all Beach Groups.

a. Control of the operations of all Beach Groups after the assault phase, and at such time as the Army assumes the supply function for the Force (#), will be exercised by the Commanding General, Force 163, through an agency designated as the Beach Control Group working directly under the Force G-4.

b. This Beach Control Group will establish a headquarters with a Headquarters Company and attached units sufficient to make it self-sustaining and capable of coordinating the operations of the Beach Groups in unloading supply ships, transporting the supplies from ship to shore, placing them in beach dumps and operating the dumps for issue.

c. The Beach Control Group Headquarters will be commanded by an Army officer and will be composed of a General Staff and a Special Staff. The General Staff will be drawn from various sections of Force Headquarters Staff and will include a Naval Officer(*). The Special Staff will be drawn from the Base Section and will represent the Base Section Commander.

d. The operational duties of the Beach Control Group Headquarters will be as follows:

(1) The coordination of the equipping, organization and training of all Beach Groups assigned for the operation.

(2) The preparation of detailed plans to control the combined supply activities of all Beach Groups to insure an adequate flow of supplies between supply ships offshore to Army beach dumps when responsibility for the Force supply is assumed by the Commanding General, Force 163.

(3) The active control of Beach Groups during the operation.

(4) The transfer of responsibility from Army to Base Section when over-the-beach supply is concluded.

2. Restrictions confining Beach Groups to Beach Operations.

a. To confine the use of the various component troops of the Beach Group to beach maintenance operations the Beach Groups will be placed in support of and not attached to the Sub-Task Forces (#).

3. Restrictions on the Use of Beach Group Vehicles.

a. Unless specifically directed by the Beach Group Commander, the use of all Beach Group vehicles, except those allocated to Signal Corps for carrying high-power radio sets and those initially allocated to Artillery as prime movers and ammunition trucks, will be restricted to the seaward side of beach dumps.

b. All Beach Group vehicles will bear a suitable, permanent, uniform marking, as determined by the Beach Control Group Headquarters, prominently displayed front and rear, and Military Police inland from beach dumps will be instructed to stop all such vehicles passing their posts and check for trip ticket properly executed.

4. Antiaircraft Protection of Beaches.

a. The responsibility for antiaircraft protection of beach installations initially rests with the Sub-Task Force Commander, and thereafter successively with the Corps and Army Commanders. Each Commander is provided with appropriate AAA command echelons.

b. Coordination of AAA with Beach Groups will be by direct contact between the Beach Group Commander and the AAA Commander furnishing protection on the respective Group beaches.

5. Smoke Protection of Beaches and Small Ports.

a. Until such time as Army assumes control, the smoke protection of beaches and small port installations is a responsibility of the Sub-Task Force Commander. To accomplish this, Smoke Troops are attached to the Beach Groups.

b. The Beach Group Commander is responsible for carrying out the Sub-Task Force and Army Smoke Plan, and in this will coordinate with the Antiaircraft Defense Commander and with the Navy and/or Air, if their interests are concerned.

6. Loading of LCMs and Use of Craft and DUKWs for Unloading.

a. LCMs loaded on M/T store ships will be top loaded and so placed that they can be rapidly lifted into the water prior to unloading of vehicles or supplies.

b. LCMs will be placed on M/T store ships which are scheduled first to start discharging.

c. The unloading of supplies from M/T store ships will be confined to LCTs and DUKWs. Supplies will not be loaded into LCMs or LCVPs except in case of emergency, and then only by direction of the Force Commander.

d. No trailers will be assault loaded unless accompanied by the prime mover. No trailer will be unloaded from an M/T store ship into LCT without an accompanying prime mover for each trailer. No trailer will be loaded into an LCM without an accompanying prime mover either in the same LCM or in an accompanying LCM.

e. No loose supplies will be loaded on LSTs by Ground Forces.

f. No loose supplies will be deck loaded on M/T store ships.

g. The AAF and RAF will furnish sufficient personnel traveling on each LST to rapidly unload their loose supplies. Such supplies shall be limited to a maximum of 50 tons per LST and will be spread over the total number of LSTs in approximately equal amounts. Beach Groups will provide necessary transportation for movement of these loose supplies from the ships to beach dumps.

7. Control of the Routing of Landing Craft and DUKWs.

a. Control of the routing of landing craft and DUKWs afloat is a function of the Navy. This control will be exercised by the Naval Beachmaster. The Army will furnish to the Navy, prior to D-day, the list of supply debarkation priorities. These priorities can be changed at any time by the Army and such change is binding on the Navy if promulgated through proper channels. The channel of command for unloading procedure originates with the Army (Sub-Task Force Commander or Army Commander) through the Beach Group Commander or Beach Control Group Commander, through the Navy Beachmaster to the Navy traffic control officer. The Navy Beachmaster, through his traffic control officers has command of all craft including DUKWs while afloat.

b. The TQM aboard each ship is responsible, through the officer in charge of the unloading detail, for carrying out the Army unloading plan. Changes in this plan will be effected by orders of the Beach Group Commander to TQMs. These orders will be relayed through the Naval Beachmaster to the ship, the Naval Beach Party being the communications agency from shore to ship and vice versa.

c. When the movement of ships from one area to another is required the channel of command will originate with Army, through Beach Group Commander, through Naval Beachmaster to Naval Task Force Commander.

8. Manifests and Hatch Stowage Diagrams and Lists.

a. Each TQM will have at least three copies of manifests and stowage lists and diagrams for loading on his ship. Upon arrival of his ship off the beach he will dispatch one copy to the Beach Group Commander. If his ship is subsequently moved to another beach he will dispatch one copy to the new Beach Group Commander showing the exact status of unloading on his ship. The TQM will not leave the ship until it is completely unloaded or withdrawn. Upon completion of unloading of the ship, including all port gear, the TQM will see that all loading details have left the ship and will report personally to the Beach Group Commander with his completed records.

b. Flatted material will be shown on separate manifests.

c. Beach Group Commanders will be responsible for establishing and maintaining a control point on all beaches over which supplies are being unloaded where manifests and loading and stowage diagrams of ships offshore of those beaches will be available.

d. The Beach Control Group will have manifests and loading and stowage diagrams of all ships.

e. Circular #55, "Stowage of Cargo", dated 9 November 1943

and issued by Headquarters, SOS NATOUSA, will be strictly followed in the loading of all ships. It will be the duty of each TQM to see that his ship is loaded in accordance with the directives of that circular. Any violations will be immediately reported to the Near Shore Control Agency.

f. Each TQM will render a daily report of supplies and vehicles unloaded during the period and a status of unloading report to the Beach Group Commander.

g. Initially it will be the reponsibility of the Sub-Task Force Commander and later of the Force Commander through his G-4 and the Beach Control Group to insure that Beach Group Commanders have preinformation of ships arriving off their beaches and priorities for unloading.

h. Complete and standard nomenclature of all weapons and ammunition will be used in the preparation of manifests and stowage lists and in all reports.

9. Vehicle loading.

a. No vehicle to be landed over the beaches will be loaded beyond its standard rated capacity.

10. Personal and Organizational Baggage.

a. Each unit will designate at least one officer and sufficient enlisted men to form a guard detail to accompany all shipments of personal baggage and barracks bags.

11. Port Companies.

a. Port Companies will be attached to the Beach Groups and will be under direct control of the Beach Group Commander.

b. When unloading of ships has been completed the senior officer of the Port Company aboard each ship will be responsible to see that all Port Company personnel is evacuated from the ship and will personally report ashore with his company or detachment to the Beach Group Commander over whose beaches the ship has been unloaded.

c. Movement of Port Company personnel from ship to ship during unloading will be the responsibility of the Beach Group Commander. The Naval Beachmaster will provide the necessary craft for such movement and will control the movement through his Traffic Control Officer.

d. Port Companies remaining ashore will perform all duties required of them by the Beach Group Commander.

e. With the arrival of succeeding convoys the assignment of Port Company personnel for the unloading will be the responsibility of the Beach Group Commander.

NOTES:

(#) The term "Force" where used in this document, refers to Force 163 - the Army echelon on the level of NCWTF. The term "Sub-Task Force" where used in this document, refers to the Infantry (or Armored) Divisions of troops. The Sub-Task Force

Commander echelon is on the same level as the Naval Attack Force Commander.

(*) Captain DOODS, U.S.N.R., Commander Beach Battalions, Eighth Amphibious Force, will function at the Beach Control Group Headquarters. He will be the naval representative of NCWTF on strictly naval matters, and on other matters, the naval representative of the Commanding Officer, Beach Control Group. He will discharge the naval responsibilities appearing in this plan.

CHAPTER 5

FORTIFIED POSITIONS

SECTION 1

INTRODUCTION

74. Purpose. This report is a study of the German fortifications built on the European continent, their reduction and their effectiveness.

75. Scope. The fortifications considered are those constructed along the Atlantic coast of France (Atlantic Wall) and those located on or near the western border of Germany, "The Siegfried Line" or "West Wall".

SECTION 2

FORTIFICATION DOCTRINE

76. The Siegfried Line.

a. The Siegfried Line was constructed with the full knowledge of all the weaknesses of the Maginot Line. The Maginot Line located just inside of and roughly parallel to the eastern French frontier consisted of major groups of forts every three to four miles with the intervals between covered by minor forts. The line had virtually no depth. Its weaknesses lay in its vulnerability to local penetration and the consequent ease with which positions could be encircled and isolated. The German General Staff was aware of these facts and planned to avoid those weaknesses in their construction.[1]

b. The Siegfried Line was constructed along the western boundary of Germany from Kleve on the Dutch frontier to the vicinity of Lorrach on the Swiss border. It was built on the first natural barrier east of the German border. The density of pillboxes and antitank barriers was designed to equalize the defensive potential of the terrain, so that no portion of the line or group of forts was weaker than any other portion. Concentrations of fortifications were therefore most dense on natural avenues of approach and on the more open pieces of terrain. The principles of area defense and defense in depth was observed. Depth and density were guaged to assure that the defense line would be resilient enough to absorb local attacks and slow up major attacks sufficiently to permit mobile reserves held in rear of the line to meet and destroy the penetrating force.[1,2,3]

77. The fortifications on the coast of France consisted of independent strong points arranged in irregular patterns commanding natural approaches and critical terrain features on the "hedgehog" principle of defense used by the Russians on the eastern front.[1] These were integrated with coastal gun positions, beach obstacles and inundated areas to contain seaborne assaults. Casemates housing antitank and field guns were usually sited to permit enfilading fire on the attackers. Machine gun boxes were sited to give supporting fire to the casemates and in many cases were capable of placing direct fire upon them. Minefields, antitank obstacles, wire entanglements and built-in flame throwers were used defensively at all strong points.[4] These strong points were to delay troop build-up over the beaches and to deny the

attacker the use of major ports. They were to limit penetration to permit mobile reserves to attack landing troops on terrain favorable to the counterattack and drive them back into the sea.[5]

78. Modifications of the Siegfried Line. After the successful landings in Normandy it became apparent to the Germans that the Siegfried Line as constructed in 1939 had certain inherent weaknesses. These included limited fields of fire, lack of suitable artillery, (most forts could only accommodate a 37mm gun), inadequate concrete protection and the density of the individual fortifications which was insufficient to prevent infiltration despite the fact that all boxes were mutually supporting.[1] Improvised improvements were immediately undertaken. Trenches were dug, minefields were laid, and antitank and wire obstacles added. The fortifications were to serve mainly as shelter during artillery and air bombardment; the fighting was to be done from the exterior positions.[1,2,3,6]

SECTION 3

GERMAN OPERATIONS

79. Functioning of German Fortifications. The Atlantic Wall and the Siegfried Line were to be manned by special fortress troops. These, in general, were second rate German soldiers and a miscellaneous collection of other nationals. The function of both the defense lines was merely that of gaining time in which to deploy the divisions which were the mainstay of the defense. Landings on all portions of the continent had been anticipated and the troops disposed accordingly. Several mobilization and concentration plans were drawn up to implement this scheme.[1,5]

80. The Atlantic Wall. In practice the Atlantic Wall functioned as intended. The troops manning it conducted the defense as planned and the fortifications fulfilled their purpose of delaying the landing force. However the Allied cover plan successfully held the major German reserves in the Calais area and permitted the troop build-up on the beaches.[1] When it became apparent that the major Allied effort was the initial assault, air strikes immobilized German reserves and reduced the effectiveness of the counterattacks.[7,8,9]

81. The Siegfried Line which was to have been the bulwark of the German defense was manned in haste by retreating troops.[1] Service elements of the German field armies in France were slow in withdrawing, impeding the withdrawal of combat elements. Some of the fortress troops had been used to reinforce the field armies.[6,7] Those remaining were inadequate to garrison the forts, and they were not fully augmented by the retreating elements whom they were to have led into the forts.[10] This policy of manning a defensive line with retreating troops was contrary to published German doctrine on the subject, however economies of manpower made it necessary.[1] The result was that the Siegfried Line was manned by beaten troops. In addition mobile reserves were not present in the number intended.

SECTION 4

ASSAULT TECHNIQUES

82. Intelligence prior to attack of both the coastal and border fortifications was complete and accurate. Photographs taken during

the construction period, supplemented by up-to-date vertical and oblique photographs and terrain reconnaissance furnished excellent information as to the location and type of pillboxes to be encountered.[2,3,11,12] Four years of neglect of the Siegfried Line had provided the majority of the positions with excellent natural camouflage. Information obtained was disseminated to the lower echelons in the form of defense overprints on 1/25000 maps. Sand tables were constructed and in some cases elaborate scale models were built to orient the troops and familiarize them with their missions.[2,3,11]

83. Assault training was initiated in the United States in 1943, when divisions then in training were authorized funds to construct simulated fortified localities. Special courses in assault techniques were conducted for officers of the Army Ground Forces at the Engineer School, Fort Belvoir, Virginia. In the European Theater of Operations, training was continued prior to the invasion of France and assault techniques were developed and practiced at the Assault Training Center at Woolacombe in England. All of this training was conducted as a formal drill dictated by the local simulated fortifications.[13] Immediately before the penetration of the Siegfried Line, unit schools and rehearsals were held to bring the troops up-to-date on the methods to be employed and to drill them in their several missions. The retraining prior to the assault of the Siegfried Line was necessitated, in part, by the attrition of previously trained personnel. The principle of all men knowing the missions and techniques of all those in their echelon was emphasized.[2,3,14]

84. The technique employed while substantially the same as that outlined in FM 31-50 reflected local conditions and no scheme of attack was standard as to detail. Each plan of attack was reduced to a series of small individual operations all highly coordinated.[2,3] Bombardment by airplanes, artillery and mortars was used to isolate a section of the line; concentrations were placed on reserve assembly areas, artillery and antiaircraft positions and likely avenues of approach over which reserves could be moved. Light artillery fire was then employed over the area to force the defenders to withdraw into the pillboxes.[2,3,14,15] Direct fire from flat trajectory weapons and small arms fire compelled the defenders to button-up each pillbox.[2,3] This having been accomplished and the mutual support of the pillboxes having been denied, it was possible to attack each fortification as a separate operation. Rocket and tank fire on the rear door or embrasures plus the application of explosives in the form of satchel or shaped charges was usually sufficient to force the surrender of the fortification.[2,3,14,15] Direct fire from self-propelled 155mm guns was also employed successfully. Where the fortification itself was not breached by direct fire or demolition the concussion was generally sufficient to force the defenders to surrender.[3]

Mass air bombardment and naval gunfire on fortified positions was ineffective in reducing fortifications except in the rare cases where a bomb exploded adjacent to a pillbox or emplacement and threw fragments through the embrasure or where a direct hit was made by naval gunfire.[2,4,16,17,18]

Well-aimed small arms fire and close artillery support were the two weapons relied on. Once the boxes were denied mutual support, the line began to come apart.[2,3,14,15] Bazookas were used effectively to penetrate the embrasures and doors. A novel technique evolved was that of using a tank or bull dozer to cover the embrasures and doors with earth.[2,3] The embrasures and doors were also welded shut; a jeep-towed electric welder was used for this purpose.[2,3] In these latter two methods the occupants usually surrendered rather than be buried alive. Flame throwers were not generally employed as a direct

weapon but when their presence was revealed by bursts of flame they had a strong persuasive effect.[2,3]

SECTION 5

PSYCHOLOGICAL EFFECTS OF FORTIFICATIONS

85. a. Following the penetration of the Atlantic Wall the Germans augmented their Siegfried Line in accordance with their revised scheme of thinking which envisaged the use of the fixed type of fortifications mainly as shelters and field works to be constructed around or near the pillboxes were to be occupied by the majority of the defenders. In this revamping of the Siegfried Line there was a tendency to regroup the factors affecting the choice of position in more or less the following order; concealment and cover, protection of lines of communications, observation, fields of fire, etc.[1,2]

b. Evidence indicates that the individual occupant of a pillbox faced with the inevitability of destruction of his own position was neither confident nor enthusiastic. The fear of being buried alive, the feeling of being alone, coupled with the helplessness of their position buttoned up within the pillbox, all contributed in a large measure to the reduction of the Siegfried Line. The resulting retreat behind the line of the Rhine had a terrific moral effect on not only the German soldiers but also on the German Staff.[1,2,6,7]

c. The prospect of attacking prepared defensive positions had no apparent deleterious effect upon the morale of the assault troops. The pride in successful accomplishment was reflected in the increased morale of all attacking troops after the fortifications had been reduced.[1,2]

SECTION 6

CONCLUSIONS

86. Reduction of Fortified Positions. An aggressive attacking force supported by ordinary infantry and artillery weapons can successfully reduce fortified positions. With thorough prior reconnaissance and inspection of the terrain to develop proper routes of approach plus complete all around training of the soldiers engaged in the operation, fortifications, once mutual support has been denied them, can be isolated and reduced. Air superiority on the part of the attacking force is considered essential.

87. Value of Fortified Positions. Extensive fixed fortifications immobilize a considerable portion of the strength of the defender, and commit him to action on a definite line of defense made known to the attacker prior to the attack. Fixed fortifications are not economical of troops since to be effective they must be adequately manned and fortress troops are thus removed from those available for the attack. Fortress troops are subject to deterioration which generally affects garrisons of this type. Such installations are ineffective, psychologically debilitating, and are an inadequate substitute for aggressive well trained field armies.

SECTION 7

RECOMMENDATIONS

88. Doctrine. That the American doctrine for the reduction of hostile fortifications is sound and should be continued. The present American doctrine for the organization of the ground for defense and the present order of priorities among factors influencing the selection of defensive positions, i.e. observation, fields of fire, obstacles, communication, concealment and cover, are sound and should be continued.

89. Special Equipment. That the development of special equipment for the reduction of fortifications be continued. This should be along the lines of further improvement of the tank dozer with its possible development into an engineer vehicle.

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CHAPTER 6

ENGINEERS AS INFANTRY

90. Purpose. FM 5-6 contemplates employment of engineers as infantry in emergencies only. In accordance with this policy the present T/O & E's do not provide the engineers with sufficient infantry weapons to make them a potent infantry force. This is a study to determine whether this policy is sound, or whether the proper policy should be to provide engineer organizations which may be committed as infantry with sufficient infantry weapons and training in their use to properly accomplish an infantry mission.

91. Circumstances Under Which Committed. Engineers were committed as infantry during tactical emergencies in almost every phase of operations in the European Theater. They fought as infantry on the beaches and through the hedgerows in Normandy,[1] in the clean-up of the Hertegen Forest,[2,3] and during the Ardennes counter-offensive.[4] They supplemented division troops when fronts became extended[5] and took over sectors of armored divisions to permit refueling and reorganization of the latter units.[6] They provided added rifle power for cavalry units.[7,8] They defended roadblocks and minefields[4,9] and provided their own security for bridgeheads and work parties.

When committed as infantry in the European Theater, reorganization of the engineer units varied in slight details among the units,[10,11] but in general followed the principles laid down in FM 5-6. In some instances additional infantry weapons were made available to engineer units fighting as infantry.[11] However, the bulk of these were crew-served weapons, with which the engineers had not been trained.[11] However the circumstances which dictated the employment of engineers as infantry were generally such that the diversion of other units of several arms to their secondary roles was also justified. Effective fighting teams were formed from engineer, antiaircraft, tank, and tank destroyer units, all of which were acting in their secondary roles to meet a special tactical situation.[9] Defensively these actions were generally emergencies;[4] offensively, they were rapid advances where the above units supplied the additional fighting strength required to keep the enemy off balance.[12]

92. Conclusions.

a. The policy contemplated by FM 5-6 with regard to the use of engineers as infantry is sound.

b. It is not necessary to provide engineers with, or train them in the employment of, crew-served infantry weapons. Further study should be given to equipping engineer combat units with heavier caliber recoilless weapons when the development of these weapons has reached a state of efficiency to so indicate.

93. Recommendations. That no change be made in the present doctrine governing the employment of engineers as infantry.

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CHAPTER 7

ENGINEER COORDINATION

SECTION 1

INTRODUCTION

94. Purpose. This chapter reviews the methods employed between echelons to coordinate routine engineer work, to point out their deficiencies, and to make appropriate recommendations. Present field manuals prescribe methods of coordination for special operations only.

95. Basic Principles.

a. Usage has established the principle that each unit engineer is responsible for the accomplishment of all work in his area essential to the mission of his unit.

b. Policy provides that engineer support be pushed forward aggressively into the area of the lower unit by the engineer of each higher unit.

c. Unit areas are those areas determined by administrative boundaries.

d. Unit engineers are the engineers of divisions and higher units.

SECTION 2

COORDINATION OF ENGINEER SUPPORT

96. Engineer Support in General. Engineer support was pushed forward habitually on one of two methods, dictated either by the type of work, or by the situation. Generally engineer support was rendered on an area basis by establishing an "engineer work boundary" forward of the administrative boundary. In some instances it was more convenient to accomplish the support on a task basis whereby the higher echelon accepted full responsibility for the completion of the specific task or tasks; (these tasks included construction of bridges in rear areas and maintenance of specific roads and are not to be confused with support during special operations). In both cases coordination was effected by mutual agreement between the unit engineers concerned, generally at the request of the engineer of the lower unit.[1,2]

97. Support at Division Level. The division engineer component was inadequate to accomplish the normal engineer missions within the division area. This weakness was often aggravated by the practice of attaching engineer elements to regimental combat teams. As a result abnormal demands were placed on the corps echelon. Divisions were normally supported by a corps engineer combat group with at least one battalion of this group at the disposal of each division. This supporting battalion bivouaced and worked within the division area. Coordination between the division engineer and the supporting engineer commander was effected through a liaison officer from the supporting battalion who remained with the division engineer. The bulk of the requests of the division for engineer support was handled automatically

by the supporting battalion which kept the group commander informed. If the work requested was beyond the capabilities of the supporting battalion, or if it appeared that it could more appropriately be accomplished by the division engineer component, the liaison officer passed the request to the group commander for decision by him or the corps engineer.[2] The establishment of this system of support confined the bulk of the efforts of the corps engineer troops to the division areas and to the forward portion of the corps area.[1]

98. Support at Corps Level. Coordination of engineer work between army and corps was arranged between army and corps engineers generally on a boundary basis.[1] Army engineer group commanders frequently represented the army engineer in arranging the necessary details. During rapid advances army engineers decentralized the responsibility for establishing the boundaries to group commanders who made the necessary arrangements with the supported corps engineer.[2] For this purpose it was necessary for groups to maintain a liaison officer at corps headquarters.[2]

99. Support at Army Level. Advance Section Communications Zone, supported the First, Third, and Ninth Armies in accordance with the formal agreement referred to below and also did additional work on both an area and task basis informally arranged between the army engineers and Advance Section, Communications Zone.[3] Support of Seventh Army by Continental Advance Section, Communications Zone, was arranged generally on an area basis by informal agreement between the respective engineers.

100. Effect of System of Support. The extensive forward displacement of engineer troops occasioned by the lack of adequate engineer strength in the divisions produced a situation where frequently a large portion of the engineers within a given area were troops of the next rearward echelon.[1,2] These troops were rarely integrated into the area security plan and created an administrative situation that the engineer of the supported unit had difficulty in controlling.[2]

101. Standing Agreements and Understandings. Certain engineer support became routine through necessity, forced by the inadequacy of the division engineer component and the resultant abnormal demands for support by each echelon on the echelon to its rear. This support applied principally to the following:

a. The responsibility for tactical bridging, both dry and floating, was passed from division to corps.[2,4,5]

b. The responsibility for fixed bridges was assumed by army, with corps troops doing this work only during those periods when the situation was relatively static, or when the supply of bridging was so critically short that corps troops had to remove existing tactical bridges to displace them forward for reuse.[2,4,5]

c. The responsibilities for certain engineer tasks in the army areas of the northern group of armies were assumed by the engineer, Advance Section, Communications Zone. These included the responsibility for all railroad rehabilitation and construction, hospital construction and pipeline construction within the area of each army. This agreement originally was drawn up in writing between Advance Section, Communications Zone, and First US Army and was later extended to include all armies operating under 12 Army Group.[3] Seventh Army assumed responsibility for a large portion of the above type of work, because Continental Advance Section, Communications Zone, did not have enough engineer troop strength to push its support forward.[6]

102. Engineer Support for Special Operations. Present doctrines indicate that engineer troops and material required for special operations will be attached from higher to lower echelons. Requests are made by engineers of the lower echelon upon the next higher echelon. When requirements are excessive, or the supply is limited, the higher echelon allocates between units of the lower echelon. The provision for these attachments, to include any limitations imposed, are generally recorded in writing.

a. The attachment of corps or army engineer units to a division was exceptional and was limited to situations when the division was operating independently,[7] or to a pursuit where control by corps was impossible.[8] Engineer support of a division during special operations was generally controlled by the corps engineer or his representative who assumed the division engineer's responsibilities.[4]

b. When corps required additional personnel for special operations, the necessary units were attached to corps and reverted to army upon completion of the operations. Restrictions when involved placed no limits on the manner of employment during the special operation. They generally consisted only in provision for breaking the attachment at a definite phase of the operation when the lower unit no longer required the services of the attached unit.[5,9,10,11]

c. Armies made few demands on Advance Section, Communications Zone, or Continental Advance Section, Communications Zone, for attachment of special units.[9]

103. Concept of Engineer Support. Normal engineer support should not be likened to normal artillery support. Artillery support consists of spot missions accomplished across the front of the supported division and rendered by units close behind the front lines. Engineer support involves an area mission, and its successful accomplishment requires the physical employment of troops throughout that area. The responsibility of unit engineers is defined by the area the unit occupies, and the forward displacement of engineer troops does not relieve the unit engineer of the responsibility for all engineer tasks back to the unit rear boundary. Engineer work is more proportional to the character of the terrain and to enemy activity than to the number of our own troops in a given area. The number of engineers attached to or supporting other arms should, therefore, be dictated more by terrain conditions than by the size of the force supported and no engineer unit should be considered as a standard complement of a combat team or task force.

SECTION 3

CONCLUSIONS AND RECOMMENDATIONS

104. Conclusions.

a. The inadequacy of the engineer component of the division caused an abnormal forward displacement of engineers in all echelons.

b. During routine operations engineer support is generally rendered by the establishment of an engineer work boundary, though sometimes it is accomplished by an agreement to accomplish certain specific tasks.

c. Engineer work boundaries between echelons did not coincide with, and were generally forward of, administrative boundaries.

d. Routine engineer work involves area responsibilities and differs in this regard from the support rendered by other arms and services, particularly since it is so much more sensitive to changes in terrain.

e. For special operations engineer support should be rendered by attaching the required unit or units to the echelon responsible for the operation in order that the command structure may remain well defined.

f. The requirements for engineer support depend more on terrain than on the size of the supported force, and there should be no standard engineer component of a combat team or task force.

g. Liaison officers with adequate transportation are essential to insure necessary coordination between echelons within a field army.

105. Recommendations.

a. That service publications and service school teachings include the procedure to be followed between echelons to coordinate the routine engineer work and include the provisions of the conclusions listed above.

b. That liaison officers and the necessary transportation for them be provided in appropriate T/O & E's.

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